

American manufacturers who require scientific assistants appear to be perfectly satisfied with the education which is given to the students. In some of the largest works the heads of departments and designers are all college graduates, and in not a few cases important and responsible posts are reached at what seems to us a very youthful age. Part of the success of American manufactures in outside markets is no doubt due to the systematic and thorough technical training of those who direct their manufacture.

The American student works harder than his English confrère, and his work is mapped out for him along strictly utilitarian lines; for the average man the American system is exceedingly good; for the very good man it is doubtful whether it is not too rigid, which may explain why there are so few scholars and brilliant exponents of research produced in proportion to the large number of students.

F. W. BURSTALL.

### ARMOUR PLATES.

THE different classes of armour which may be used are as follows:—Wrought iron, steel, compound, Harvey, and Krupp types.

Wrought iron was largely used in the first armour-clad battleships, and the late Sir John Brown was practically the first manufacturer of them on a large scale in this country. Owing to its toughness and freedom from cracks under the impact from projectiles, this type held its own for a long time; it could be produced at a fairly cheap rate, and was readily worked into shape. Although attempts were made to employ steel long ago, owing to the higher cost of this material and the methods of fusion not being sufficiently perfected, until comparatively recently, to enable mild or soft steel to be produced—that is, steel low in carbon—this material did not make much way until, in France, methods were introduced of producing at one operation large masses of mild steel.

In this country, however, we branched off into compound plates—that is, plates composed of wrought iron with hard steel faces. There is no doubt, however, that the French policy was the better one, as mild steel plates, though perhaps more easily perforated, do not crack under impact to the same degree as compound plates.

Owing, however, to the enterprise of the American, Harvey, it was found possible to take soft steel plates and carburise them in a similar manner to that which has been used for centuries—that is, carburising by the cementation process (though, of course, Harvey's treatment was necessarily varied to suit the altered nature of the material being treated), so that steel plates were obtained with faces containing considerable percentages of carbon, up to 70 or 80 per cent., whilst the rear still retained its original soft and tough condition. Such a plate, after being treated and quenched in water, either wholly or on the hard side, then possessed a very hard surface, against which a shot broke into fragments.

Further improvements were introduced at Krupp's Essen Works, both as regards the composition of the steel used in the plates, a material being obtained of tough nature, yet having great tensile strength with high elastic limit, and also a further improvement was effected by carburising the surface by means of gas cementation instead of charcoal. More regular and uniform results have been thus obtained than by any other process, and though by means of specially shaped projectiles, or projectiles fitted with soft metal caps, such plates can be perforated, this is much more difficult than formerly. Ordinary ogival projectiles without caps go to pieces upon impact, their striking energy being wasted in breaking themselves instead of perforating the plate attacked. Briefly, it may be said that the latest type of hard-faced plates possess about twice the resistance of

the older type of plates. This enables a great saving to be effected in the weight of armour to be used for the protection of the modern warship.

My firm has, however, recently produced capped projectiles which, with a slightly higher velocity than the average usually employed, readily perforate hard-faced plates, so that before long we may expect the latest type of plates to be found quite vulnerable. Thus the battle proceeds, first the plate wins, then the projectile, until perhaps some day all civilised nations may find it more profitable to revert to a simpler and more effective method of settling difficulties than by trying to kill each other.

R. A. HADFIELD.

### NOTES.

EXPRESSIONS of opinion from political leaders as to the value of scientific advice, and the need for scientific methods in Government Departments, are so rare, that some remarks which Lord Rosebery made upon this subject at Chatham on Tuesday come almost as a surprise. We have over and over again referred to the lack of interest in the progress of science, and the disinclination to take advantage of available applications, shown by official authorities concerned with national affairs. Only recently some of the scientific lessons taught by the war have been pointed out in these columns (pp. 37, 83), and some of the services which a committee of men of science could render to the Government if their advice were asked have been indicated. From the subjoined extract from Lord Rosebery's speech it will be seen that he is in accord with the methods advocated in these columns. If the war leads to an acknowledgment of the value of scientific opinion, the result will be one upon which the nation may be sincerely congratulated. The *Times* reports Lord Rosebery to have said:—"We ought to get another great advantage out of this war, for, after all, we in this country have much to learn, and this war will have been a cheap one, whatever it may cost, if it has made us learn several important lessons. I humbly think that in this country we live a great deal too much from hand to mouth. We do not proceed by scientific methods. We go on the principle that things have carried on so well so far, that we are a noble nation, that we are very rich, that we are pretty numerous, and that we have so muddled out right in the end. But I say this, that we are a people of enormous waste. We waste simply by not pursuing scientific methods. I do not like to compare us with Germany. It is hardly safe to mention the name of foreign Powers lest some innuendo be suspected, or else some guilty thought in one's mind. But at any rate we may be certain of this—taking Germany as an example of the opposite method of treatment—Germany is infinitely more painstaking and scientific in its methods than we are. But, without taking as a model Germany or any other country, I believe, if we wish to take full advantage of the lessons of this war after it is concluded, we must become more scientific in our methods in commerce, in education, and in war. We are not methodical, we are not scientific, we are not abreast of the more advanced nations of the day; and if we want to keep our place we shall have to consider the lessons we have been taught in this respect. Depend upon it, however brilliant you may be, the tortoise of investigation, method, and preparation will always catch up and overtake the hare which leaves everything to the inspiration and effort of the moment. Great as the task before us in the field is at this moment, the task that remains for us after this war is completed is the greatest task that ever lay before a nation. You will have, when this war is over, to put your Empire on a business footing. We must have no more discussions as to the way in which one thing has happened to go wrong or has happened to go right. We must consider, deliberately, patiently, and scientifically, the methods by which we have been accustomed to proceed, and

see in what way they have fallen short, and determine to reconsider and revise them."

PROF. H. G. ZEUTHEN, professor of mathematics in the University of Copenhagen, and M. Peron, of Auxerre, have been elected correspondants of the Paris Academy of Sciences.

WE notice with much regret the announcement that Prof. D. E. Hughes, F.R.S., died suddenly on Monday, January 22, at the age of sixty-eight.

SIR JOHN LUBBOCK, on his elevation to the peerage, has decided to take the name of Lord Avebury, after a property of his in Wiltshire. Letters Patent have been passed granting the adoption of this title.

DR. G. K. GILBERT, of the U.S. Geological Survey, has been elected president of the American Association for the Advancement of Science.

DR. GEORGE M. DAWSON, director of the Geological Survey of Canada, was elected president of the Geological Society of America at the annual meeting held on December 27, 1899.

THE death is announced, at the age of fifty-three, of M. Marion, Curator of the Natural History Museum at Versailles.

ON the 16th inst. two violent explosions occurred at the Avigliana dynamite factory near Turin, ten persons being killed and thirty injured. Both explosions were distinctly heard in Turin, although the distance is fully 25 km.

MR. C. A. SCHOTT, chief of the computing division of the U.S. Coast and Geodetic Survey, has retired from that post in order to devote his whole time to special scientific work. He has been succeeded by Mr. J. F. Hayford.

MR. J. B. CARRUTHERS has been appointed mycologist to the Government of Ceylon and assistant-director of the Botanical Gardens at Peradeniya. He will leave England early in March to take up his duties, which will chiefly be the investigation of the diseases of economic plants in the island.

DR. KARL GOEBEL, professor of botany and director of the Botanical Institute at Munich, is now associated with Prof. E. Selenka and Prof. J. Rosenthal as editor of the *Biologisches Centralblatt*. All botanical communications intended for that periodical should be sent to Prof. Goebel.

M. DE FONVIELLE informs us that the solar halos and mock suns observed on January 11, and referred to in our notes last week (p. 279), were seen over a large part of Western France. A detailed description of the phenomenon, with illustrations, will appear in *Cosmos* of January 27.

THE distinguished diatomist, Dr. Grunow, has presented his very large collection of diatom-slides to the Imperial Natural History Museum at Vienna. A very carefully prepared selection of microscopic slides made by the late Mr. W. T. Suffolk has been presented by his representatives to the Royal Microscopical Society.

MR. WILLIAM HENRY POWER, F.R.S., the Assistant Medical Officer and Medical Inspector for General Sanitary Purposes of the Local Government Board, has been appointed to the office of Medical Officer of the Board, in succession to the late Sir Richard Thorne Thorne, K.C.B. Dr. H. Franklin Parsons has been appointed successor to Mr. Power, and Dr. R. Bruce Low has been appointed an assistant medical officer of the Board.

A REUTER telegram from Madrid, dated January 20, states that, in view of the declarations of the Minister of Public Works in the Chamber, the Spanish Government proposes to make the

best possible arrangements at the Madrid Observatory for the reception of foreign astronomers, who will observe the eclipse of the sun on May 28. Nevertheless, other places are better adapted for the purpose, as, for example, Naval-Moral, 200 kilometres from Madrid on the Caceres line, because at that place the eclipse will be total for two minutes.

THE *Electrician* states that the Admiralty have determined to fit several vessels of the Channel Squadron, viz. the *Majestic*, *Magnificent*, *Hannibal* and *Jupiter*, with wireless telegraphic apparatus on the Marconi system; and the signal boatswains of the two flag-ships and two petty signal officers on each of the ships in question are now being instructed in wireless telegraphy on board the *Hector* at Portsmouth. It may be regarded as extremely probable that all the vessels of the navy will eventually be equipped with wireless telegraphic apparatus.

SCIENCE has suffered a considerable loss by the death of Mr. James R. Gregory, whose services to mineralogy are widely known. Mr. Gregory was born on December 29, 1832, and while a boy at school he showed great interest in minerals and fossils. He started his active career as an expert in gems, but afterwards took up mineralogy and geology, and got together some valuable collections. In 1867 he went to South Africa prospecting for minerals, and introduced from there the crocidolite. He exhibited a collection of minerals at the Paris Exhibition in 1867, and was awarded a medal. He also exhibited at the Fisheries and Health Exhibition, and wrote the report on minerals and gems for the Indian and Colonial Exhibition. In addition to many rare mineralogical and geological specimens, Mr. Gregory possessed a fine collection of meteorites, which he had been getting together for about forty years. He was a member of several scientific societies, and had sincere regard for the progress of natural knowledge.

INCORRECT maps and neglect of compass bearings are two of the causes to which the *Times* correspondent attributes General Gatacre's repulse at Stormberg. As science is concerned with both these matters, we reproduce the correspondent's remarks upon them:—(1) The map of the ground was utterly misleading and worse than useless. Not only was the contouring so incorrect as to give a totally false picture of the configuration of the hills, but the actual distances and the roads were inaccurately represented. (2) So far as I am aware, no one amongst the responsible authorities had taken any compass bearings, and consequently no one knew where he was being taken in the dark.—The special correspondent of the *Times* at Cape Town thinks that the latter point is exaggerated, and remarks:—"Owing to the abundance of magnetic ironstone all over South Africa (and the name 'Rooi-kop,' 'red-head,' probably indicates its presence near Stormberg) compass bearings are liable to be all over the place, especially at night, when it is impossible to know how near one may be to magnetic rocks. At Chieveley one day I was taking some bearings which made Colenso lie due east instead of north, north for the nonce happening to be a large stone a yard or two away."

AN earthquake, resulting in great loss of life, occurred on September 20, in the neighbourhood of Smyrna. More than 1600 persons, it is estimated, were killed, and more than 2000 wounded, while 11,000 houses were destroyed. The epicentre appears to have been situated in the Meander valley between Aidin and Sarakeui, and a large number of the damaged towns and villages are situated in this valley within an area more than sixty miles long. The railway line between Aidin and Omurlou was raised by fully one yard, while in other parts of the valley the ground has sunk. Some additional details are given in a letter that we have received through a correspondent. "Practically every building within an area of 1200 square miles," he says,

"was damaged to a greater or less extent—most being levelled to the ground. For instance, Denizli had 4500 houses, and of these 2400 are completely down; Sarakeui had 800, and of these 600 are down. . . . From a scientific point of view the earthquake was most interesting, and the cause or the consequences of it, was that the greater part of the Meander and Legens valleys have subsided from two to six feet."

ACCORDING to the *Listok* of Tiflis, the earthquake of December 31, 1899, which destroyed so many houses at Akhalkalaki (Transcaucasia) and in ten neighbouring villages, and during which more than 200 persons perished under the ruins of the houses, was well observed at the Tiflis Physical Observatory. The first shock was at 1h. 50m. 30s. p.m., and had the unusual duration of 1m. 4s. It was felt with special severity in the hilly part of the city, on the right bank of the Kura river. Lamps were set swinging in the houses, vessels fell from the cupboards, and heavy crosses went down from the bell towers of several churches. The direction of the shock was N.W. to S.E. The second, much feebler shock, was at 4h. 38m. 34s. p.m., and lasted four seconds only; its direction was N.N.W. to S.S.E. The third shock, at 8h. 45m. p.m., was not shown by the seismoscope of the Observatory, which is situated on the left bank of the Kura, but was noticed on the right bank of the river. The earthquake was also noticed at the Tkivbuli, Tsipa, Varvarino and Kvirily stations of the Transcaucasian railway (from 1h. 47m. to 1h. 50m. p.m.), where it damaged several station houses, as well as at the Kalagelan (1h. 48m.), Sviri and Zugdidi stations of the Kars railway (at 2h. 22m., at the two last ones), as well as at the high-level stations of Abas-tuman (4h. 50m.) and Kobi (2h. 1m.).

ONE of the wonders of the New York Zoological Park, recently opened to the public, is a great cage for birds. It represents an attempt to do for certain large and showy water birds precisely what has been done in the Park for the hoofed animals, the buffalo, the otter and other species—to give them all a section of Nature's own domains; and when the birds are finally put into the cage they will fly in real freedom, for it incloses three forest trees of considerable size. The structure is 152 feet long, 72 feet wide, 55 feet high, and consists of a series of steel pipe arches and purlins over which wire netting has been tightly stretched; chain netting is used so as to afford the least possible obstruction to the eye. It contains a pool of water 100 feet long and an abundance of shrubbery. Another important building is the reptile house, which is one of the finest structures ever erected in a zoological garden. It is 146 feet long, and its greatest width is over 100 feet; it cost about 45,000 dollars.

AT several stations on the Indian coast tidal curves are automatically recorded by means of self-registering gauges, and are used in the construction of tide-tables containing the predicted times and heights of high and low water at about forty ports. The report of the work of the Survey of India Department during 1898, which reached this country at the end of last year, contains tables showing the agreement of the actual with the predicted times and heights for each year of the period 1890–1897. Taking the averages of the eight years, it appears that at open coast stations, 71 per cent. of the predictions of the times of high water were within fifteen minutes of the actual times, and 70 per cent. of the low water estimates were within the same limits of accuracy. The estimated heights were more accurate, 95 per cent. of the predictions of the heights of high water being within eight inches of the observed height, and 93 per cent. of the low water heights were within the same margin of error. Of course, a difference of eight inches means more at some places than at others; nevertheless, the forecasts as a whole may be regarded as satisfactory.

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FROM the annual report of the Royal Alfred Observatory, Mauritius, for the year 1898, we learn that the mean rainfall at seventy-one stations was 76·85 inches, against an average of 77·89 inches; the rainfall for the month of August was the greatest on record, and was highly beneficial to the sugar crop. There were apparently two tropical cyclones in the South Indian Ocean during the year, the tracks of which have been approximately laid down on a chart. The magnetographs were at work throughout the year; disturbances occurred on thirty-nine occasions; the principal were February 11–13, March 15–16, and September 9–11. Photographs of the sun were taken daily when the weather permitted, and the negatives were forwarded to the Solar Physics Committee. There were sun-spots on 302 days; the great feature during the year 1898 was the sudden outburst of activity in September, after a decided decrease as compared with the previous year. No brilliant auroræ were observed.

SO little is known of the fauna of British lakes that a paper on the Entomostraca of Lake Bassenthwaite, by Miss E. M. Pratt, published in "Studies in Biology from the Biological Departments of Owens College," is of distinct value. In an introductory note, Prof. S. J. Hickson refers to the possible practical value of this investigation to fishery. It is well known to fishermen that the lakes in Cumberland vary very considerably in their "trout" reputation. Bassenthwaite is not regarded as a very good lake for trout, but, on the other hand, it contains an abundance of perch and pike. It would be extremely interesting if in time a systematic study of the relations between the fish-fauna and the Entomostracan fauna could be undertaken. This would not be a very costly investigation, and Prof. Hickson thinks it would require the whole time of a competent naturalist provided with a modest laboratory on the lake side for a period of two or three years. Biology stands in great need of investigations of this kind; but though there are many willing workers, few funds are available to equip them and provide them with the necessities of life while their researches are in progress.

THE subject of parasitism in freshwater mussels has been investigated by Mr. H. M. Kelly (*Bulletin Illinois Laboratory*, vol. v., art. 8), with the object of determining to what extent the degree of infection would vary in allied species in the same or different localities. The results seem to indicate that the capacity for being infested by each particular host is to a great extent a characteristic of the species.

THE first number of the *Revue Scientifique (Revue Rose)* for 1900 contains an account of the addresses delivered by well-known naturalists on the occasion of the "jubilee" of the Société de Biologie. An interesting survey of the history, growth, and work of the Society was given by MM. Bouchard and Gley, from which it appears that the progress in the past has been satisfactory, and that there is every augury for a hopeful future.

THE managers of the Marine Biological Laboratory of Wood's Holl, Massachusetts, have issued an attractive syllabus of the course of study and instruction in the department of botany for the thirteenth season, from July 5 to August 15, 1900. It comprises courses of lectures, together with a laboratory course of instruction by experienced teachers, on cryptogamic botany, plant physiology, plant cytology, and microtechnique, together with special lectures and courses of lectures by experts on branches which they have made their special study.

IN vol. iii. (No. 6) of the *Records* of the Australian Museum, Mr. R. Etheridge, jun., describes, under the name of *Blechno-xylon*, some remains of a curious fern-like plant from the Coal-



measures of New South Wales, indicating a totally new structural type. Fern-like in its general characters, this plant presents the peculiarity of developing secondary wood in its stem, so that we have the association of fern-foliage with a stem characteristic of higher plant-groups. It is suggested that it may prove to be allied to the so-called Cycado-filices of Dr. Potonie—organisms that appear to be on the border-line between the now well-differentiated groups of Cycads and Ferns.

IN the same journal, Mr. E. R. Waite records the occurrence, on the coast of New South Wales, of an example of the rare Ribbon-fish, or Oar-fish, of the genus *Regalecus*. Like all other known specimens, the present example was imperfect, and belonged to the female sex. As is well known, there is great variation in the relative length and breadth of the body, as well as in the number of the fin-rays, of the different specimens of *Regalecus* hitherto obtained; but Mr. Waite seems favourably inclined to the view that such differences are only of individual value.

IN the *Atti dei Lincei*, viii. (2), 11, Prof. Pietro Tacchini gives statistics of the earthquake which occurred at Rome on July 19 of last year, and Dr. G. Agamennone discusses the Emilian earthquake of the night of March 4-5, 1898, the epicentre of which was situated in the Apennines. Dr. Pericle Gamba contributes a brief account of the magnetic properties of bricks, &c., that have been struck by lightning, and his observations are in conformity with the theory that the singular points and zones ("punti distinti e zone distinte") observed in rocks and bricks are only produced in a powerful magnetic field, such as is due to violent discharges of atmospheric electricity, and that their magnetisation is independent of the earth's magnetic field. These conclusions accord with the views of Dr. Folgheraiter.

AMONG the various properties of multi-dimensional space, the analogues of the five regular polyhedra are of interest. In the *Verhandeligen* of the Amsterdam Academy, M. S. L. van Oss discusses the "regular 600-cell," i.e. the form bounded by 600 tetrahedra, which can exist in space of four dimensions. The paper, which deals also with the self-congruent displacements of the form in question, is illustrated by fourteen plates, showing the figures of the 600, the 120, and other regular forms in four-dimensional space, so far as these can be made visible by their projections on two mutually independent rectangular co-ordinate planes.

WE have received an elaborate memoir, by Dr. Wilhelm His, on protoplasmic studies of the ova of the salmon, published in the *Abhandl. Sächsischen Gesellschaft*, 1899, No. 3.

As we learn from the Report of 1899, the Bristol Museum has been enriched by a fine series of Neolithic implements and weapons presented by Mr. J. E. Pritchard, by whom they were collected in Somerset and the adjacent counties. The same institution has likewise received an unusually fine skeleton of an *Ichthyosaurus*.

FROM Rome we have received a copy of *Vox urbis*, a periodical in Latin, mainly devoted to literature and fine arts, and published fortnightly. The present number is illustrated by views of Orvieto Cathedral, and the contents, which border most nearly on science, are short articles by R. Spina, on "Telepathy," and by A. Costaggini, on artificial gems.

THE first part for the current year of the *Proceedings* of the Washington Academy of Sciences consists of a synopsis of the Mexican and Central American Umbelliferae, by Prof. J. M. Coulter and Mr. J. N. Rose, illustrated by several plates and numerous text-figures.

THE number of *La Nuova Notarisia* for January contains a biographical sketch, by Prof. G. B. De Toni, of the late Count Abbé F. Castracane, together with a complete list of his contributions to botanical literature. This occupies five pages of close print, and comprises upwards of one hundred and twenty separate papers, of which by far the larger number refer to the structure, reproduction, and mode of life of diatoms.

FROM Dr. A. Fock, of Berlin, we have received a pamphlet of 128 pages, entitled "Ueber die Grundlagen der exacten Naturforschung." It is a philosophical dissertation dealing with the fundamental conceptions of number, magnitude, length, time, mass, force and energy, the doctrine of causality, the atomic theory, the ether, and so forth, and it gives us the general impression of being well written and clearly expounded. Messrs. Mayer and Müller, of Berlin, are the publishers.

A FOURTH edition of the "Lehrbuch der Botanik für Hochschulen," by Profs. Strasburger, Noll, Schenck and Schimper, has just been published by the firm of Gustav Fischer, Jena.

A "LIVERPOOL MATHEMATICAL SOCIETY" has recently been established. At a meeting held on January 12, at the University College, Prof. Sircom read a paper on some hydrodynamical problems.

A NEW and enlarged edition of the Rev. James Gall's "Easy Guide to the Constellations" has just been published by Messrs. Gall and Inglis. The book provides a simple means to enable any one to become familiar with the constellations and the individual stars represented upon the thirty small maps.

MESSRS. HENRY HOLT AND CO., New York, announce for immediate publication Atkinson's "Lessons in Botany" and Barnes' "Outlines of Plant Life." Both books are simplified and abbreviated editions of earlier books by the same authors, and are adapted to the needs of pupils in secondary schools.

A CLASSIFIED list of separate papers from the various publications of the Smithsonian Institution, at present available at a nominal price, has just been distributed by the Institution. The papers will be supplied, by preference, to persons engaged in original research in the branch of science to which the work asked for pertains, to those engaged in educational work, and to collaborators of the Institution.

THE preface of the thirty-fifth volume of the "Zoological Record" contains the important announcement by the editor, Dr. David Sharp, F.R.S., that "This volume includes the literature of the Cœlenterata for two years, and brings the indexing of all the branches of zoological literature up to date." The volume was published towards the close of last year, and relates chiefly to the zoological literature of 1898.

MR. WILLIAM CROW, of Stratford, has issued a "century chart," designed to indicate that the nineteenth century does not end until the completion of this year. The chart shows 100 years marked upon a dial, the zero point being at the place where the figure XII. usually occurs on the face of a timepiece. The zero thus represents the dividing line between the end of one century and the beginning of the next, and a hand drawn upon the chart to indicate the position of the present year is shown to have to reach the zero again to complete the nineteen hundredth year.

AMONG the other scientific books in preparation at the Clarendon Press, the following are noteworthy:—"The Structure and Life-History of the Harlequin Fly," by Prof. L. C. Miall, F.R.S., and Mr. A. R. Hammond; "Physical Aspects of Soils," by Prof. R. Warington, F.R.S.; "A Catalogue of Eastern Lepidoptera Heterocera in the Oxford University Museum (Part II. Nocturna)," by Colonel C. Swinhœ; Gœbel's "Organography of Plants," translated by Prof. J. Bayley

Balfour, F.R.S.; and "A Textbook of Arithmetic," by Mr. Richard Hargreaves.

A NEW monthly magazine—*The International Monthly*—made its appearance at the beginning of this year, the publishers being the Macmillan Company. The periodical is a serious addition to contemporary literature, and contains instructive essays on progress in several departments of knowledge. Science is represented by an article, by Prof. N. S. Shaler, on the connection between solar energy and terrestrial formations and phenomena; and Prof. John Trowbridge gives an outline of recent advances in physical science. For each department of the magazine, there is an editor in France, another in Germany, and a third in England, as well as one in the United States.

A SERIES of monthly star maps, prepared by Mr. Walter B. Blaikie for the Scottish Provident Association, provides a concise source of reference to the ordinary observer not possessing any special astronomical knowledge. The maps give a planispheric projection of the heavens, as seen from London, for the first day of each month at 10 p.m., each map being divided into two portions, showing the northern and southern aspects respectively. A considerable amount of useful information is given in the letterpress accompanying the maps, including short descriptions of the more interesting celestial objects, and particulars respecting the planets visible during each month.

THE sixth volume in the biological collection of the "Scientia" series of scientific treatises, published by Messrs. G. Carré and C. Naud, Paris, is concerned with the "Evolution du Carbone et de l'Azote," by Dr. P. Mazé. The three chapters which make up the volume deal respectively with the origin of carbon in the organic world, the origin of organic nitrates, and the decomposition of organic compounds. Many subjects of interest to chemists and plant physiologists are passed in review: for instance, the mechanism of carbohydrates in leaves by means of diastasis, the assimilation of the organic carbon from the soil, and formation of fatty substances, the formation of the quaternary compounds in the higher plants, and the relation of various forms of life to the proportion of carbon dioxide in the atmosphere.

MESSRS. WILLIAMS AND NORGATE'S current "Book Circular" contains the following announcements:—Dr. R. Hartig has thoroughly revised his "Lehrbuch der Baumkrankheiten," and will shortly issue the third edition under the title "Lehrbuch der Pflanzenkrankheiten."—A second revised and enlarged edition of Dr. Julius Wiesner's "Die Rohstoffe des Pflanzenreichs" is in preparation. The first part will be issued shortly.—Dr. Eugen von Halácsy will publish very shortly the first part of a flora of Greece, Epirus, and the Ionian Islands, under the title of "Conspectus Floræ Græcæ." The first instalment will consist of some 160 pages, and it is expected that the work will be complete in about eight parts.—The first part of the handbook of the Siphonogamæ, by Drs. Dalla Torre and Harms, will very shortly be published under the title "Genera Siphonogamarum."—A supplementary volume to Beilstein's "Handbuch" is being prepared by the German Chemical Society under the editorship of Prof. Paul Jacobson, and will be issued in parts during this year.

THE system of determining latitudes by observing at groups of stations close together instead of at a single station, was again given a trial by officers of the Survey of India department in 1898, and is referred to in the report which has recently been published. The system originated with Lieut. J. Herschel, several years ago, but was allowed to drop, because that officer was removed from the work before he had fully elaborated it. For the new experiments the longitudinal station at Agra was

selected as the central point, but for reasons which had not been foreseen it was found impossible to connect the outlying stations by a sufficiently rigorous triangulation for a proper comparison of the observed and computed azimuths. The latitude observations led to interesting results, and opinion is expressed that in more favourable country the system will prove highly valuable.

THE dilution law given by Ostwald in 1888,  $K = \frac{\alpha^2}{(1-\alpha)V}$  (where  $\alpha$  is the percentage dissociation and  $V$  the volume of liquid containing one molecular weight of the binary electrolyte), was a most important step forward in the study of solutions. But as further investigations were made on this subject, it was found that this dilution law holds only for weak acids and bases, and not for salts, strong acids and strong bases. The Ostwald expression was derived directly from the law of mass action, but subsequent attempts to modify it in the direction of including strong electrolytes were empirical. Thus Rudolphi's

$K = \frac{\alpha^2}{(1-\alpha)\sqrt{V}}$ , and van't Hoff's  $K = \frac{\alpha^3}{(1-\alpha)^2 V}$  were advanced in 1895, and the latter, which can be more compactly written  $K = C_i^3/C_s^2$  (where  $C_i$  denotes the volume concentration of the dissociated portion and  $C_s$  that of the undissociated salt), represents the facts fairly well for "strong" electrolytes. Since there is no sharp line of demarcation between strong and weak electrolytes, it follows that there must be electrolytes which are on the border line between these two classes, and for which neither formula holds with accuracy. In the current volume of the *Zeitschrift für physikalische Chemie*, Dr. W. D. Bancroft seeks to replace these by a third formula, which, though empirical and indeterminate, may describe all binary electrolytes. This formula is  $K = C_i^n/C_s$ , including both the Ostwald and van't Hoff expressions as special cases. Dr. Bancroft points out that the simplest way of determining whether the general formula  $K = C_i^n/C_s$  does or does not apply is to plot the value of  $\log C_i$  against  $\log C_s$  as ordinates. If the formula applies, the resulting curve will be a straight line, and the slope of the line gives the value of  $n$ . Values are given in the paper for solutions of potassium, sodium, lithium, ammonium and hydrogen chlorides, sodium potassium and silver nitrates, potassium iodide and caustic potash, and with the exception of the most concentrated solutions, the data lie absolutely on straight lines; the values of  $n$  found varying from 1.36 to 1.55. A theoretical explanation of these facts would be of the greatest interest.

THE additions to the Zoological Society's Gardens during the past week include a Vervet Monkey (*Cercopithecus lalandii*) from South Africa, presented by Mr. A. Althorp; a Woodcock (*Scolopax rusticula*), British, presented by Mr. W. A. Beauclerk; a Short-eared Owl (*Asio brachyotus*) captured in the Indian Ocean, presented by Dr. A. E. Prest Hughes; two White-headed Sea Eagles (*Haliaeetus leucocephalus*) from North America, presented by Mr. Henry Anger; a Laughing Kingfisher (*Dacelo gigantea*) from Australia, presented by Mr. J. Kirkland; two Triangular-spotted Pigeons (*Columba guinea*) from South-West Africa, presented by Mr. J. Parmenter; two Wagler's Terrapins (*Hydaspis wagleri*) from Brazil, six Blanding's Terrapins (*Emys blandingi*), a Grass Snake (*Contia zernalis*), a Mocassin Snake (*Tropidonotus fasciatus*) from North America, a Flat-backed Tortoise (*Testudo platynota*) from Burmah, an Indian River Snake (*Tropidonotus piscator*), an Indian Eryx (*Eryx johni*) from India, ten Reeve's Terrapins (*Damoniea reevesi*) from China, two — Chelodines (*Chelodina*, sp. inc.) from Australia, a Royal Python (*Python regius*) from South-West Africa, deposited; eight Burrowing Owls (*Speotyto cunicularia*) from South America, purchased.